CLAIMS

1)

A device for implantation, able to make use of at least part of the hydraulic energy generated by the heart (10) at its natural phases of work, said device including at least one actuator (24) connected to the cardiovascular system of the organism, said actuator arranged in order to transfer the hydraulic energy to an executive organ (29) said executive organ arranged to influence certain defined functions within or outside the organism
characterised by
the actuator (24) consists of a hydraulic motor (24a) located outside the cardiovascular system of the organism, said hydraulic motor arranged to conduct at least part of the hydraulic fluid to and fro between the hydraulic motor and its connecting site to the organism, and/or between arteries and/or veins and that the executive organ (29) consists of at least one pump (24b) powered by the hydraulic motor (24a), said pump delivering hydraulic fluid to and fro vessels synchronously or asynchronously in relation to the rhythm of the heart with or without pressure amplification.

2)

A device according to claim 1, wherein a regulating mechanism (30) is arranged between the hydraulic motor (24a) and the pump (24b) for adjusting the running parameters of the device.

3)

A device according to claim 1, wherein the hydraulic motor (24) is connected to more than one pulsating pressure source (12,17,50)

4)

A device according to claim 1, wherein the hydraulic motor (24) is a deplacement motor (24a), for example a piston motor, a compression chamber, bellows or a similar device,
and that a piston rod, a pusher plate (59) or a similar device is connected to the piston, to the membrane or the like of the deplacement motor (26) and that the executive organ (29) is a piston pump (24b), a pressure amplifier (60) or a similar device. (Fig 4-10)

5)

A device according to claim 1, wherein the hydraulic motor (24) is a rotation motor for example a turbine and that the executive organ (29) is a rotation pump (54) or a similar device, and that a magnetic connection (102) or a similar device is arranged between the hydraulic motor (24) and the executive organ (29). (Fig. 16, 17)

6)

A device according to claim 1, wherein the hydraulic motor (24), the executive organ (29) and a transferal organ arranged in between the hydraulic motor and the executive organ are integrated in one unit (for example Fig. 6, 22, 23).

7)

A device according to claim 6, wherein the hydraulic motor (24a) is a first bellows (37) influenced by a spring and the transferal organ (28) is a pusher plate (59) connected to said first bellows, said pusher plate includes an opening (67) supplied with a stop valve (39) and that the executive organ (29) is a second bellows (38) connected to said pusher plate (59) of said first bellows (37) and that said second bellows is configured with a cross sectional area being different to the cross sectional area of said first bellows (Fig. 6, 20).

8)

A device according to claim 1, wherein the the hydraulic motor (24a) consists of two piston – or bellows motors (24a), working in parallel, each motor connectable to a ventricle of the heart (12,17) and where said motors are interconnected by a regulating mechanism (30), (Fig. 5).

9)

A device according to claim 4, wherein the pressure side of the hydraulic motor (24a) and the piston pump (24b) are arranged to communicate with each other through a connection tube (41) containing a stop valve (39) and that the piston – and pump rods (28, 34) are interconnected via a regulating mechanism (30), (Fig. 7).

10)

A device according to claim 1, wherein the piston rods (28,34) of the hydraulic motor (24a) and of the piston pump (24b) are interconnected via a regulating mechanism (30) as a counterpulsator (Fig. 8).

11)

A device according to claim 1, wherein a shuttle valve (46) is included at the anterior aspect of the hydraulic motor (24a) and that said shuttle valve is arranged to be able to establish connection between the heart and the hydraulic motor in the contraction phase of the heart while being able to establish connection between the hydraulic motor and a vein (51) in the relaxation phase of the heart (Fig. 10)

12)

A device according to claim 1, wherein the hydraulic motor (24a) is arranged to power a pump (54), said pump having an inflow opening which is connected to a compartment of the body (56) and having an outflow opening (57) being connectable to the circulatory system of the body (Fig. 17)

13)

A device according to claim 1, wherein the hydraulic motor (24) is connected to a pump working as a pressure amplifier (60), said pump arranged to raise the blood pressure to dialysis pressure, and that said amplifier is connected to the blood side (62) of an implanted apparatus for dialysis (61) while the water side (63) of the dialysis apparatus is connected with a tube (71) for transport of liquid out of the body. (Fig 19).

14)

A device according to claim 1, wherein the hydraulic motor (24) is arranged to power a predilution pump (70) parallel with the executive organ (29). (Fig.20)

15)

A device according to claim 7, wherein the bellows (37) active as hydraulic motor (24a) contains at least one other bellows (38) and that said bellows is arranged as a pump (38), and that the first and second bellows share a common pusher plate (59) adjusted by a regulating mechanism (30) in one end and that each bellows has its fluid connection at the other end (Fig. 23,25)

16)

A device according to claim 15, wherein a third bellows (78) is arranged concentrically within existing first and second bellows (37,38), and that two of the bellows are connected to each a ventricle of the heart while the third bellows is connected to an artery (50), (Fig. 26).

17)

A device according to claim 1, wherein at least one membrane (79) is arranged between the heart (10) and the hydraulic pump (24) and/or between the hydraulic pump and the executive organ (29), said membrane being for example a bladder (80, 81, 82) or a similar device, said membrane arranged to separate the blood side from the hydraulic fluid of the corresponding unit (Fig. 25,§)

18)

A device according to claim 10, wherein the hydraulic motor (24a) is connected to one ventricle (17/12) of the heart (10) and that the pump (24b) acting as counterpulsator is connected to an artery deriving from the other ventricle (17/12) resulting in an action where one ventricle powers the hydraulic motor (24a) in systolic phase, while in diastolic phase a pressure is generated in the artery (15/20) of the opposite side. (Fig.18)

19)

A device according to claim 1, wherein sensors (77), gauges (83) and/or registering devices (75) are located within the organism in order to detect or quantify specific functions of the body, with the purpose to influence the regulation of the hydraulic motor (24) and/or the executive organ (29). (Fig. 15,21,27)

20)

A device according to claim 19, wherein signals from said sensors, gauges or registering devices are arranged to be processed by a preferably implanted computer (91). (Fig.27)

21)

A device according to claim 1, wherein a regulating mechanism (30) is arranged and includes different control units (31,32,33), said control units being arranged to be adjusted or regulated by a preferably implanted computer (91) and that said computer is arranged to communicate with the surrounding via a data port located under the skin.

22)

A device according to claim 21, wherein the regulating mechanism (30) includes a first control unit (31) for limitation of stroke of for example the piston rod (28) of the hydraulic motor (24a), and/or includes a second control unit (32) for regulation of the gear between the hydraulic motor (24a) and the hydraulic pump (24b) and/or includes a third control unit (35) for regulation of the settings of the spring.

23)

A device according to claim 1, wherein the device includes a shuttle valve (46) in the system after the hydraulic motor (24a) in the direction of the flow, said shuttle valve arranged to close one first opening of the valve (48) against a vein each time pressure is raised, while at the same time open the port connected to the hydraulic motor or a similar device. (Fig.11)